UL 10A

STANDARD FOR SAFETY

Tin-Clad Fire Doors

UL Standard for Safety for Tin-Clad Fire Doors, UL 10A

Twenty-First Edition, Dated January 30, 2009

Summary of Topics

This revision of ANSI/UL 10A dated March 10, 2022 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The requirements are substantially in accordance with Proposal(s) on this subject dated January 21, 2022.

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ANSI/UL 10A-2009 (R2022)

HISTORICAL NOTE

The title "Tin-Clad Fire Doors" is historically related to two- or three-ply wooden core construction covered with sheet steel as thin as 0.01 in (0.25 mm) coated with "roofing grade" terne "plate" having a composition of 20 percent tin and 80 percent lead. More recently the title has been retained as also applying to identical construction except for the substitution of zinc coating for terne coating with the provision that zinc coated metal should be painted with a good grade of corrosion resisting paint prior to shipment.

The maximum metal section (plate) size of 14 by 20 in (356 by 508 mm) is dictated by the original concept that the extremely thin base metal was to be secured only by nails having their heads covered by fold-over laps and the need for the resultant seams to be spaced sufficiently close as to prevent bulging or surface distortions.

The original title has been retained to relate to the basic concept for this class of construction in trade usage, as is so referenced in several national and other building codes, as well as in the current edition of the Standard for Fire Doors and Other Opening Protectives, NFPA No. 80.

This edition has been edited to delete use of the word "plate" as the present trade usage of this term relates to hot-rolled steel having a thickness of at least 0.230 in (5.8 mm).

UL 10A

Standard for Tin-Clad Fire Doors

Previous numbered and unnumbered editions of standards covering this material have been published since 1903.

Sixteenth Edition – December, 1968
Seventeenth Edition – December, 1973
Eighteenth Edition – February, 1980
Nineteenth Edition – February, 1993
Twentieth Edition – February, 1998

Twenty-First Edition

January 30, 2009

This ANSI/UL Standard for Safety consists of the Twenty-First Edition including revisions through March 10, 2022.

The most recent designation of ANSI/UL 10A as a Reaffirmed American National Standard (ANS) occurred on March 10, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 10A on October 21, 1984. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover the design and construction details of tin-clad fire doors which when so fabricated have demonstrated in fire tests conducted in accordance with the Standard for Fire Tests of Door Assemblies, UL 10B, fire performance properties which warrant their use as fire doors having a rating of 3, 1-1/2, or 3/4 hour.

1.2 The doors covered by these requirements are intended to be mounted with fire door hardware of the following types:

a) Sliding hardware and

b) Swinging hardware.

1.3 A tin-clad fire door employing materials and/or having forms of construction differing from those detailed herein are to be examined according to the intent of these requirements and shall be tested for fire performance in accordance with the Standard for Fire Tests of Door Assemblies, UL 10B. If when so tested, it is determined that the fire door complies with the Conditions of Acceptance of this test method it is to be classified as a tin-clad fire door having the applicable fire performance rating of 3, 1-1/2, or 3/4 hour.

1.4 Doors complying with these requirements are classified as to temperature rise on the unexposed side to 250°F (139°C) maximum at the end of the first 30 minutes of exposure to fire; or have no classification referencing temperature rise. See Table 2.1.

1.5 A door conforming to these specifications consists of a core made up of layers of boards nailed to each other, encased in terne or zinc coated steel in the form of sections jointed together at their edges and nailed through the seams to the core.

1.6 Requirements for the location and time rating are contained in codes, such as the International Building Code published by the International Code Council and the Building Construction and Safety Code, NFPA 5000. The method of installation required for fire doors is not included in these codes. Requirements for the details for the installation of tin-clad fire doors, including the requirements for vent holes and glazing are included in the Standard for Fire Doors and Other Opening Protectives, NFPA 80.

1.7 These requirements do not cover electrical, mechanical, or other features which relate to the risk of fire or accident beyond the scope of these requirements.

2 General

2.1 Sizes and ratings

2.1.1 The sizes and ratings for three-ply and two-ply doors are given in Table 2.1.

2.1.2 Table 2.1 pertains only to the maximum size of the opening. Doors limited in size by this table fall into two categories:

a) Swinging doors intended to be installed within an opening and

b) All sliding doors and those swinging doors intended for surface mounting outside of the opening.

Swinging doors in (a) are limited in size to the maximum dimensions specified for the opening. Doors in (b) must be larger than the maximum opening dimensions to provide the minimum 4 in (102 mm) lap at each side and the top of the door as required by the Standard for Fire Doors and Other Opening Protectives, ANSI/NFPA 80. Doors exceeding these two basic dimension considerations are termed "Oversize," the design and construction of which are not necessarily fully covered in these requirements.

2.2 Units of measurement

2.2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2.2.2 The tolerance for all dimensions shall be as specified with the dimension. Where no tolerance is shown, the tolerances specified in Appendix A shall apply. See Appendix A for specifications.

2.3 Undated references

2.3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

Table 2.1
Sizes and ratings

Type, method of operation and maximum size of opening	Rating and class of opening	Maximum exposed glass area
Three-ply	3 hr.[a]	None
Swinging single		
6'0" x 12'0" (1.83 x 3.66 m)		
Swinging in pairs		
10'0" x 12'0" (3.05 x 3.66 m)		
Sliding single and	1-1/2 hr.[a]	100 sq. in. per door (0.065 m^2)
Center-parting	3/4 hr.[a]	1296 sq. in. per light (0.84 m^2)
120 sq. ft. (11.15 m^2) with maximum dimension 12'0" (3.66 m)		
Vertically sliding		
80 sq. ft. (7.43 m^2) with maximum dimension 10'0" (3.05 m)		
Two-ply	1-1/2 hr.[a]	100 sq. in. per door (0.065 m^2)
Swinging single		
6'0" x 10'0" (1.83 x 3.05 m)		
Swinging in pairs	3/4 hr.[b]	1296 sq. in. per light (0.84 m^2)
10'0" x 10'0" (3.05 x 3.05 m)		
Sliding single		
80 sq. ft. (7.43 m^2) with maximum dimension 10'0" (3.05 m)		

[a] 3-hour and 1-1/2 hour doors have a maximum temperature rise limitation of 250°F (139°C) maximum at 30 minutes.

[b] 3/4-hour doors with large glass lights are not classified as to temperature rise as they are subject to temperature rises in excess of 650°F (361°C) on the unexposed side.

MATERIALS

3 Lumber

3.1 The following soft woods shall not be used, unless only one kind of lumber is used in the assembly of a single core:

Cedars– All Classes	Northern White Pine	Sitka Spruce
Cypress – All Classes	Redwood	Yellow Poplar
Douglas Fir	Eastern Spruce	Tupelo Gum
Western White Pine		

3.2 Other kinds of lumber shall not be added to the foregoing list, unless the kind of wood to be used has properties equivalent to the above species with regard to low resin content, light weight, resistance to fungus and decay, and ability to withstand nailing without splitting or splintering.

3.3 Lumber shall have a moisture content of 19 percent or less at the time of manufacturing door cores. Tests for moisture content shall be made using the oven drying or the electrical meter method in accordance with Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials, ASTM D4442.

3.4 Stocks of lumber shall be stored under cover in the premises of the fire-door manufacturer for at least one month before being used in the manufacture of fire-door cores, and while in storage shall be piled in such a manner that the air has free access to all surfaces of each board. Kiln drying is accepted for the 30-day drying period.

3.5 The boards shall be nominal 1-in (19.1 mm) lumber, surfaces on two sides and matched. They shall be without beading, beveling, painting, or other treatment.

3.6 The actual thickness of the boards shall be not less than 3/4 in (19.1 mm).

3.7 The boards shall not be less than 4 in (89 mm) nor more than 8 in (178 mm) in nominal width.

3.8 The nominal width (or stock width) is greater than the actual width over the tongue and groove.

3.9 The boards shall be free from wane (bark), decay, knot or other holes, loose knots, unsound knots, or knots exceeding 2-1/2 in (64 mm) in any dimension.

3.10 Lumber of a No. 2 Common or Construction grade or better will meet these requirements. However, because some pieces of No. 2 grade are unacceptable, the kind of lumber used and its condition shall be judged from characteristic properties of the wood as commonly known. These characteristics include:

a) DECAY – Destruction of the wood substance due to the action of wood-destroying fungi;

Note: "Dote" and "rot" are synonymous with "decay" and are any form of decay which is evident either as a dark red discoloration, not found in the sound wood, or the presence of white or red rotten spots.

b) ADVANCED (Typical) DECAY – The older stage of decay in which the destruction is readily recognized because the wood has become punky, soft and spongy, stringy, ring shaped, pitted, or crumbly;

c) INCIPIENT DECAY – The early stage of decay which has not proceeded far enough to soften or otherwise perceptibly impair the hardness of the wood;

d) KNOT – That portion of a branch which has become incorporated in the body of a tree;

e) LOOSE KNOT – A knot which is not firmly held in place by growth or position;

f) TIGHT KNOT – A knot so fixed by growth or position that it firmly retains its place in the wood piece;

g) HOLLOW KNOT – A hollow knot is an apparently sound knot except it contains a hole over 1/4 in (6.4 mm) in diameter or a void area behind the knot;

h) CHECK – A separation along the grain, the greater part of which occurs across the rings of annual growth;

i) WANE – The lack of wood from any cause, or bark on the surface of lumber.

3.11 To permit judging of the several characteristics of knots, such are to be measured across their lines of growth for oval and circular knots. For spike knots the measurement is to be parallel to the lines of growth. In all cases the measured distance is to be the visible portion of the knot and is normally darker or lighter than the coloring of board.

3.12 The following characteristics are to be judged as unacceptable:

a) Oval, circular, or spike knots exceeding 2-1/2 in (64 mm) in any direction (D or L), as shown in Figure 3.1.

b) Loose knots, open knots, or any knot over 1 in (25.4 mm) in any direction located on the tongue or lip.

c) Loose knots, open knots, through holes, and surface pits [deeper than 1/16 in (1.6 mm)] in the central portion of the board.

d) Hollow and decayed knots.

e) Checks, advanced (typical), and incipient decay.

f) Warpage, which prevents the boards from being nailed flat, or which affects the flatness of the nailed core.

g) Cluster knots or knots in groups [less than 5/8 in (15.9 mm) apart].

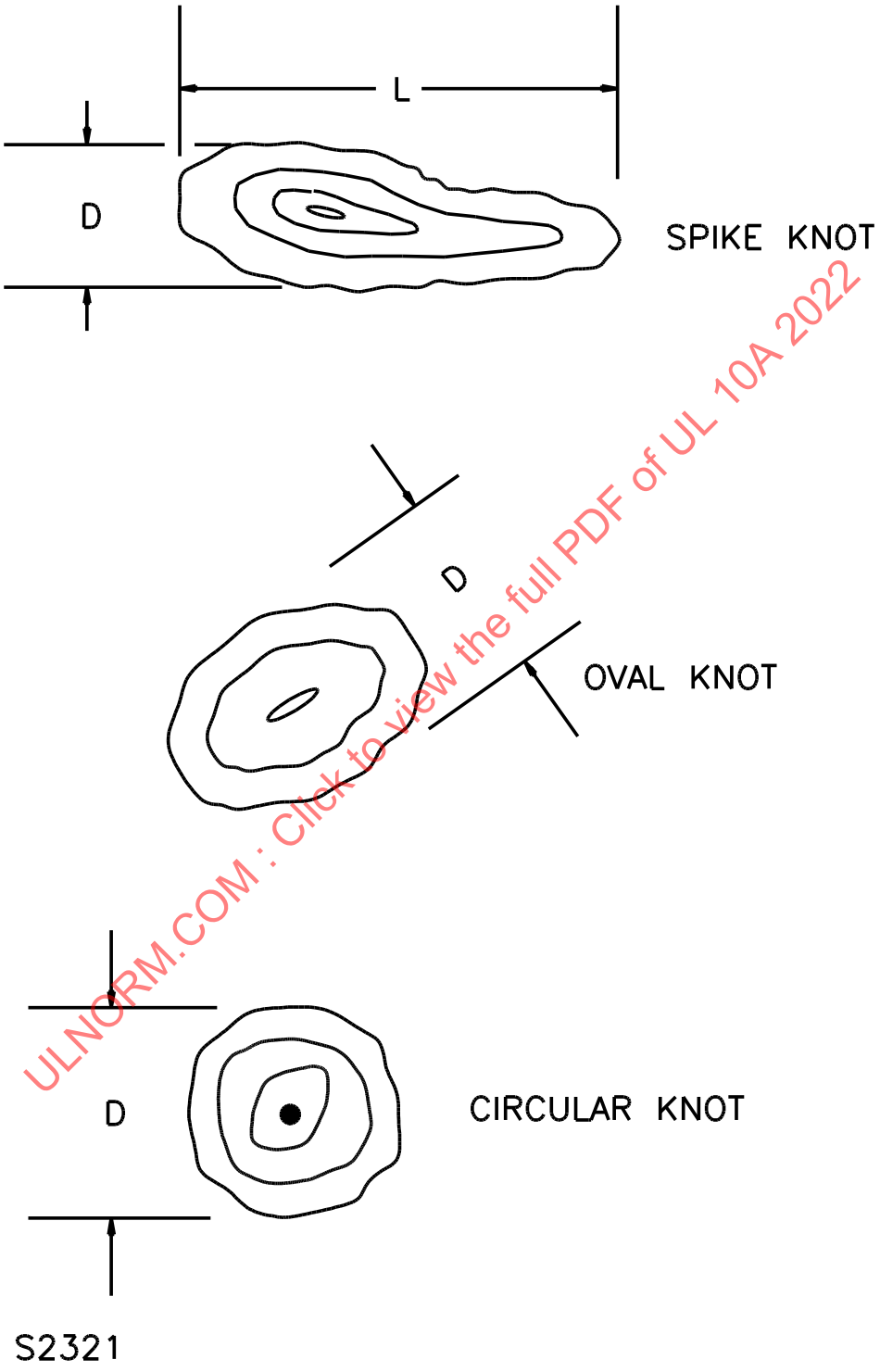
3.13 Tight knots on the lips or tongue of a board are acceptable if, due to manufacturing, they have been chipped, but only to the extent that:

a) The dimensions of the damage do not exceed 3/8 in (9.5 mm) in length and 3/16 in (4.8 mm) in diameter and

b) The lip or tongue with a chip is not easily broken, such as upon exerting direct hand pressure.

Figure 3.1

Types of knots



4 Metal Coverings

4.1 General

4.1.1 The terne or zinc-coated steel sections shall have straight edges and square corners when a deviation from a square does not exceed 1/32 in per ft (2.7 mm/m) and is true with straight joints and does not require patching of the rows of sheets in the covering.

4.2 Terne coated sheet steel

4.2.1 Terne coating shall be understood as indicating an alloy coating of tin and lead hot-dipped applied. The terne coating shall be uniformly applied to both sides of sheet steel having an uncoated thickness of not less than 0.010 in (0.25 mm). The terne coating shall not crack, peel, or flake when formed.

4.2.2 The coating shall be in conformance with the coating designation LT55 in Table I of ASTM A308, Specification for Steel Sheet, Terne (Lead-Tin Alloy) Coated by the Hot-Dip Process: not less than 0.55 oz/ft^2 (168 g/m^2) average weight of coating (total both sides) by triple spot test and not less than 0.40 oz/ft^2 (122 g/m^2) of terne coating (total both sides) by the single spot test, with not less than 40 percent of the coating on any side, based on the single spot test requirement in ASTM A308. Material that is less than 18 in (457 mm) wide is subject to the single spot test and 40 percent per side minimum requirements only. The weight of terne coating is determined by any method; however, in case of question the weight of terne coating shall be established in accordance with Procedure D of the test method of ASTM A309, Standard Test Method for Weight and Composition of Coating on Terne Sheet by the Triple-Spot Test.

4.3 Zinc coated (galvanized) sheet steel

4.3.1 Zinc coated (galvanized) sheet steel shall have an uncoated thickness of not less than 0.010 in (0.25 mm). The zinc coating shall not crack, peel, or flake when formed.

4.3.2 Finished doors shall be painted with corrosion-resisting paint before shipment. Before painting, zinc surfaces shall be cleaned and pretreated to provide for adherence of the paint coating.

4.3.3 The protective coating of zinc shall be as applied to hot-dipped, mill galvanized sheet steel conforming to the coating Designation G60 or A60 in the Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, ASTM A653/A653M. The weight of zinc coating shall be determined by any method; however, in case of question, the weight of coating shall be established in accordance with the test method of ASTM A90, Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

5 Nails

5.1 Core nails shall be cut nails of the clinch type or duck bill point type power driven nails that clinch. For three-ply cores, the nails shall not be less than 2-7/8 in (73 mm) nor more than 3 in (76 mm) long. For two-ply cores, the nails shall not be less than 1-11/16 in (43 mm) nor more than 2 in (51 mm) long. The shank diameters of duck bill point nails shall be 0.130 – 0.140 in (3.30 – 3.56 mm) for three-ply doors and 0.100 – 0.110 in (2.54 – 2.79 mm) for two-ply doors.

5.2 Nails for applying the metal covering shall be wire nails with flat heads. The shank of the nails shall not be less than 0.091 in (2.31 mm) nor more than 0.109 in (2.76 mm) in diameter. The nails for three-ply cores shall be 2 in (51 mm) long, and for two-ply cores shall not be less than 1-1/4 in (32 mm) nor more than 1-1/2 in (38 mm) long.

CONSTRUCTION

6 Assembly of Boards

6.1 The details for the assembly of boards are shown in Figure 6.1 and Figure 6.2.

6.2 Only one stock width of board shall be used in any one core. As an exception, the edge board and the stock board immediately adjacent to the edge board can differ in width from the remaining stock boards. Edge boards shall finish not less than 3 in (76 mm) in width, and the exposed edges shall not be tongued or grooved.

Figure 6.1

Assembly of boards in three-ply core

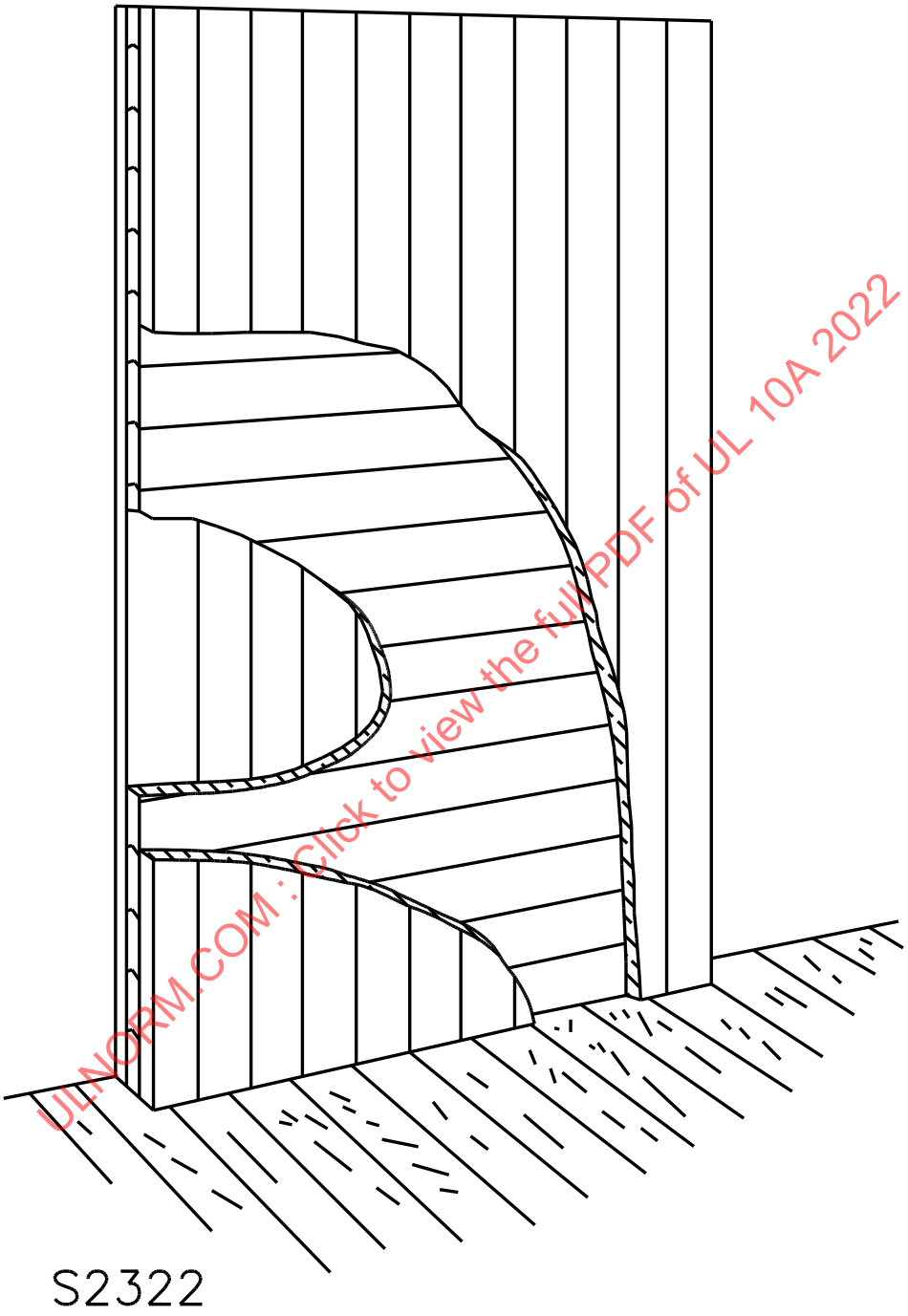
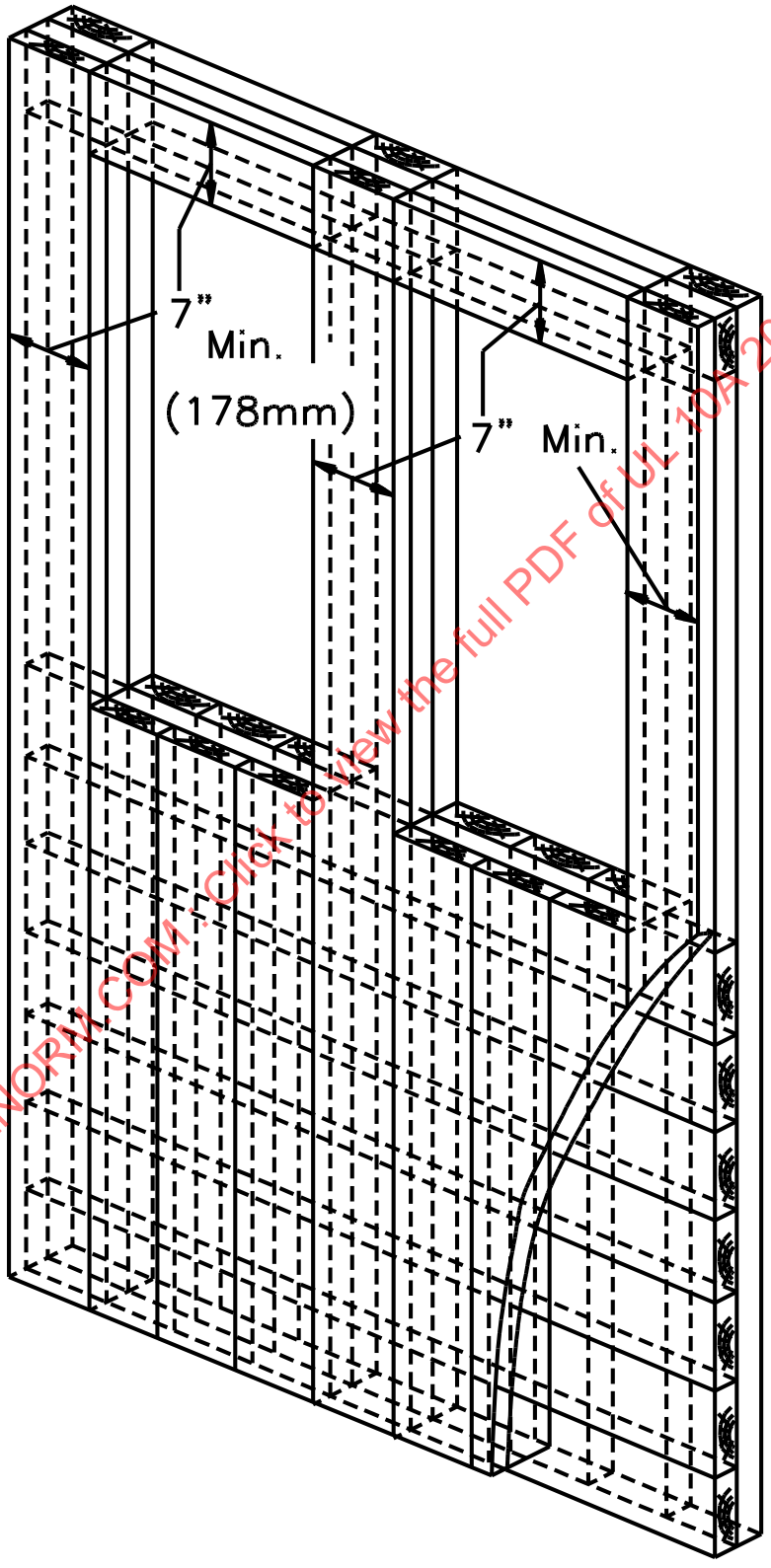


Figure 6.2

Assembly of boards in three-ply core with glass openings



6.3 Boards shall not be less than 1 ft (305 mm) in length, with ends cut square. Not more than two pieces shall be used in any continuous strip in any outside layer of a two-ply or three-ply core, nor more than three pieces in any middle layer strip of a three-ply core. At least alternate strips in outside layers shall be full-length boards.

6.4 Outside layers in a three-ply core and one layer of a two-ply core shall be vertical, and the other layer horizontal.

6.5 The several boards in each layer and the ends of pieces of boards in strips shall make tight joints at edges and ends of boards.

6.6 When glass panels are supplied, the boards in the normally vertical layers bordering the sides of the panel opening shall be continuous from top to bottom of the door, and boards in the normally horizontal layer bordering the top or bottom of the panel opening shall be continuous from side-to-side of the door. The distance between the panel opening and the side of the door shall be not less than 7 in (178 mm). See Figure 6.2.

6.7 As an alternate to the general board arrangement described in 6.4, when glass panels are supplied and the panel opening is of such a size that the distance between the opening and the edges of the door is less than 2 ft (610 mm), all boards bordering the vertical edges of the opening have the option of being laid vertically and all boards bordering the horizontal edges of the opening have the option of being laid horizontally.

6.8 The top edge for a sliding door designed to close by gravity shall conform to an incline of 3/4 in per foot (63 mm/m).

6.9 The minimum face width of the top horizontal board of a core having the top edge inclined shall be not less than 3 in (76 mm) at one end. See Figure 7.2 – Figure 7.4.

7 Nailing of Cores

7.1 General

7.1.1 The boards shall be nailed so that the several layers are fastened tightly together, with the points of the nails turning back and clinching thoroughly in the face of the core and with no portion of the nails projecting beyond the surfaces of the core. See Figure 7.1.

7.2 Two-ply and three-ply cores of boards 3 to 4 inches (inclusive) stock width

7.2.1 The details for nailing of boards 3 to 4 inches, inclusive, stock width are shown in Figure 7.2.

7.2.2 Horizontal rows of nails shall be about the center of each horizontal layer board.

7.2.3 Vertical rows of nails shall be about the center of each vertical layer of board.

7.2.4 Nails in horizontal and vertical rows shall be spaced not more than five times the face width of each board.

Figure 7.1

Nailing in three-ply core – showing clinching

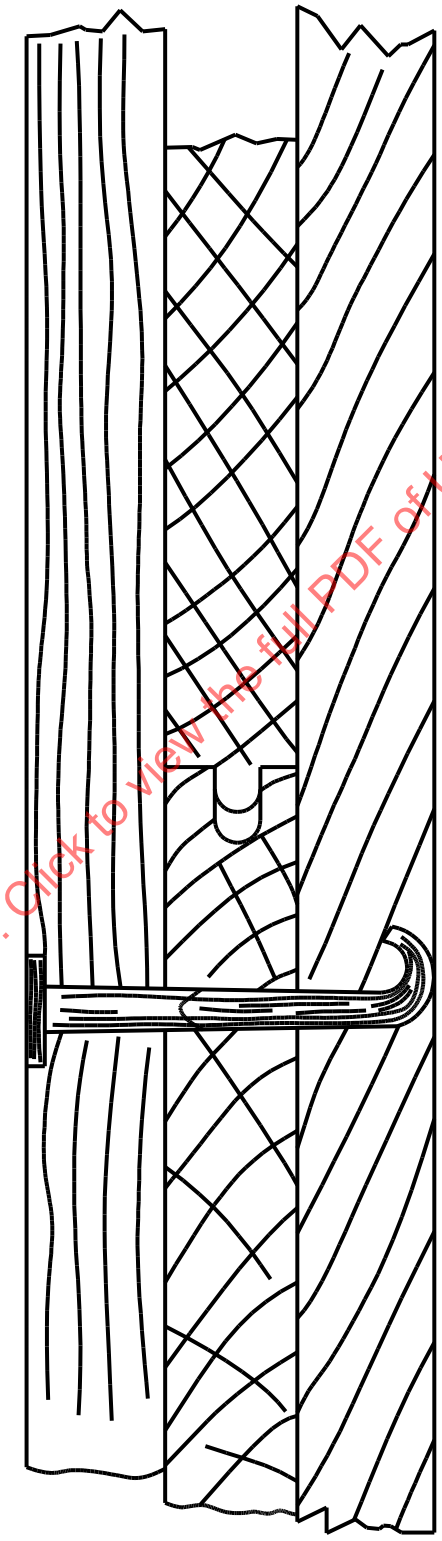


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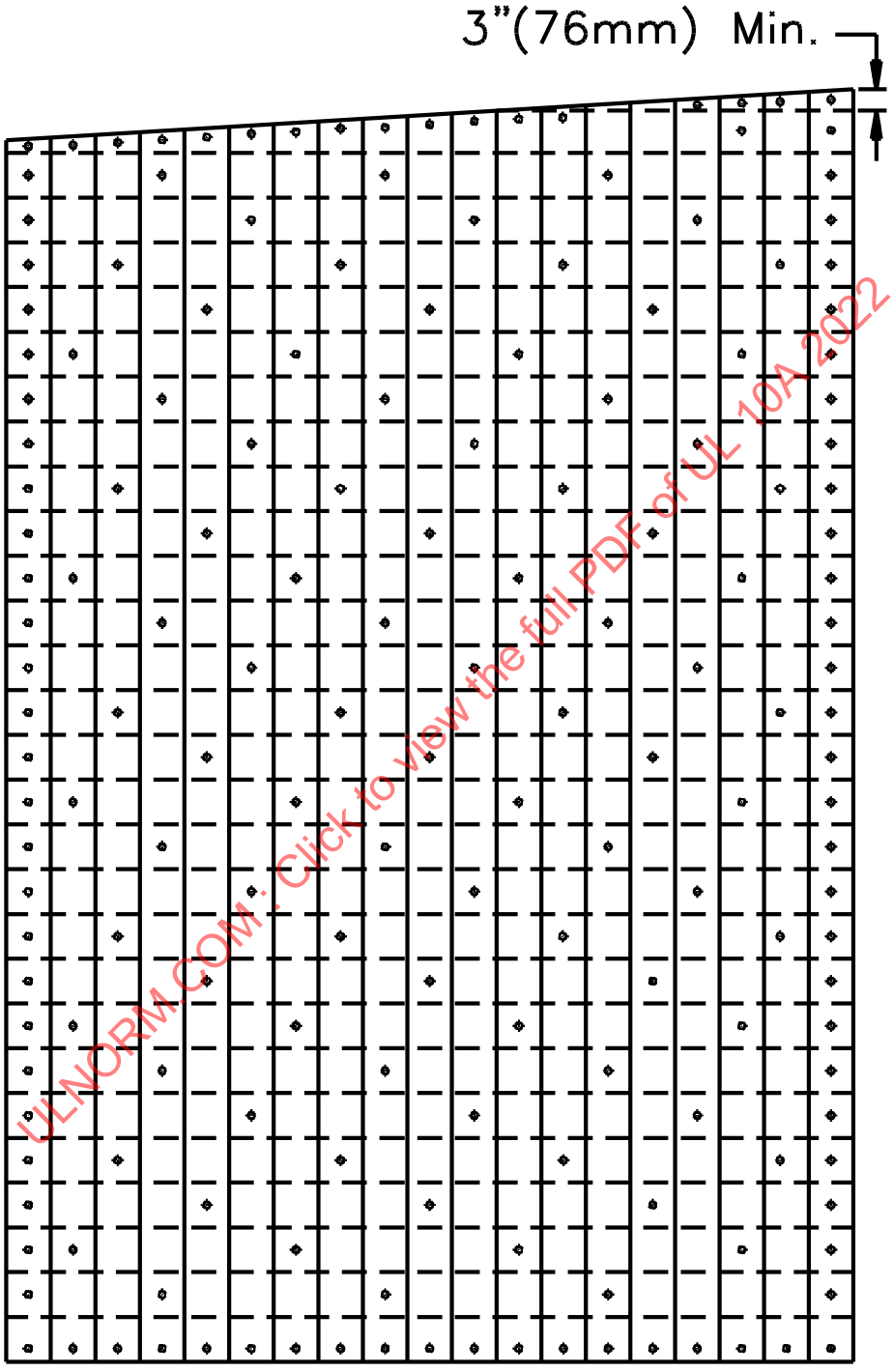
Figure 7.2

Nailing for 3- to 4-inch stock



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(See 7.2.1 – 7.2.7)

7.2.5 Rows of nails at edges of core shall be about 1-1/2 in (38 mm) from each edge.

7.2.6 Nails in vertical edge rows shall be placed not more than the face width of each board and shall be about the center of each horizontal board.

7.2.7 Nails in horizontal edge rows shall be spaced not more than the face width of each board and shall be about the center of each vertical board.

7.3 Two-ply and three-ply cores of boards 4-1/2 to 8 inches (inclusive) stock width

7.3.1 The details for nailing of boards 4-1/2 to 8 in, inclusive, stock width are shown in Figure 7.3.

7.3.2 Horizontal rows of nails shall be about 1 in (25 mm) from each edge of each horizontal layer board (two horizontal rows of nails through each horizontal board).

7.3.3 Vertical rows of nails shall be about 1 in (25 mm) from each edge of each vertical layer board (two vertical rows of nails through each vertical board).

7.3.4 Nails in horizontal and vertical rows shall be spaced not more than twice the face width of each board.

7.3.5 Rows of nails at edges of core shall be about 1-1/2 in (38 mm) from each edge.

7.3.6 Nails in vertical-edge rows shall be spaced not more than the face width of each board and shall be about the center of each horizontal board.

7.3.7 Nails in horizontal edge rows shall be spaced not more than the face width of each board and shall be about the center of each vertical board, except that the nails in the top edge row of a core having the top edge inclined shall be spaced not more than 4-1/2 in (114 mm).

7.4 Three-ply cores only of boards 4-1/2 to 8 inches (inclusive) stock width

7.4.1 The details for nailing of boards 4-1/2 to 8 in, inclusive, stock width for three-ply core only are shown in Figure 7.4.

7.4.2 Horizontal rows of nails shall be about the center of each horizontal layer board.

7.4.3 Vertical rows of nails shall be about 1 in (25 mm) from each edge of each vertical layer board (two vertical rows of nails through each vertical board).

7.4.4 Nails in horizontal rows shall be spaced not more than twice the face width of each board.

7.4.5 Nails in vertical rows shall be spaced not more than twice the face width of each board.

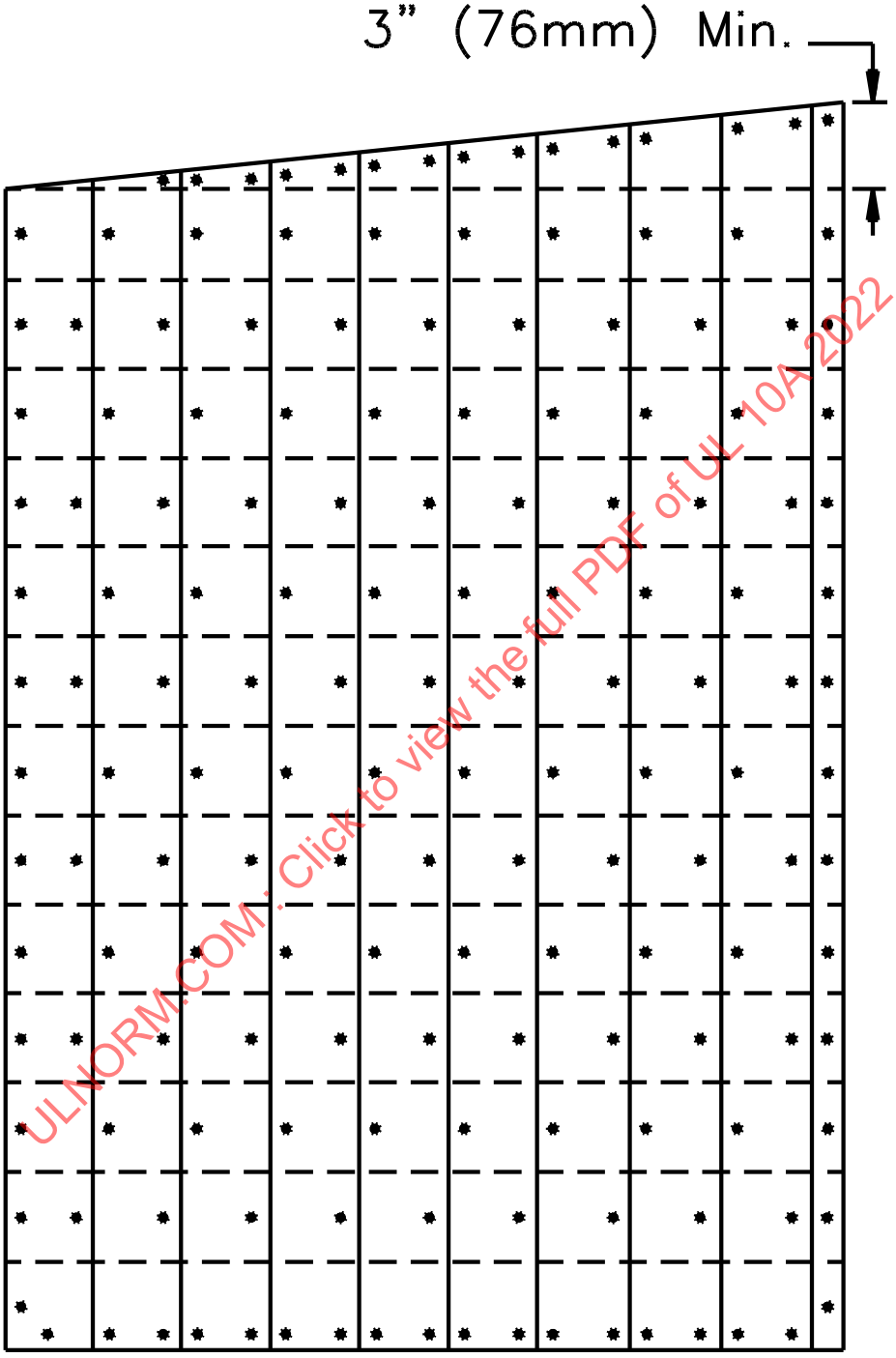
7.4.6 Rows of nails at edges of core shall be about 1-1/2 in (38 mm) from each edge.

7.4.7 Nails in vertical edge rows shall be spaced not more than the face width of each board and shall be about the center of each horizontal board.

7.4.8 Nails in horizontal edge rows shall be spaced about 1 in (25 mm) from each edge of each vertical board, except that each vertical edge board shall have only one nail, which shall be placed about the center of the board.

Figure 7.3

Nailing for 4-1/2- to 8-inch stock



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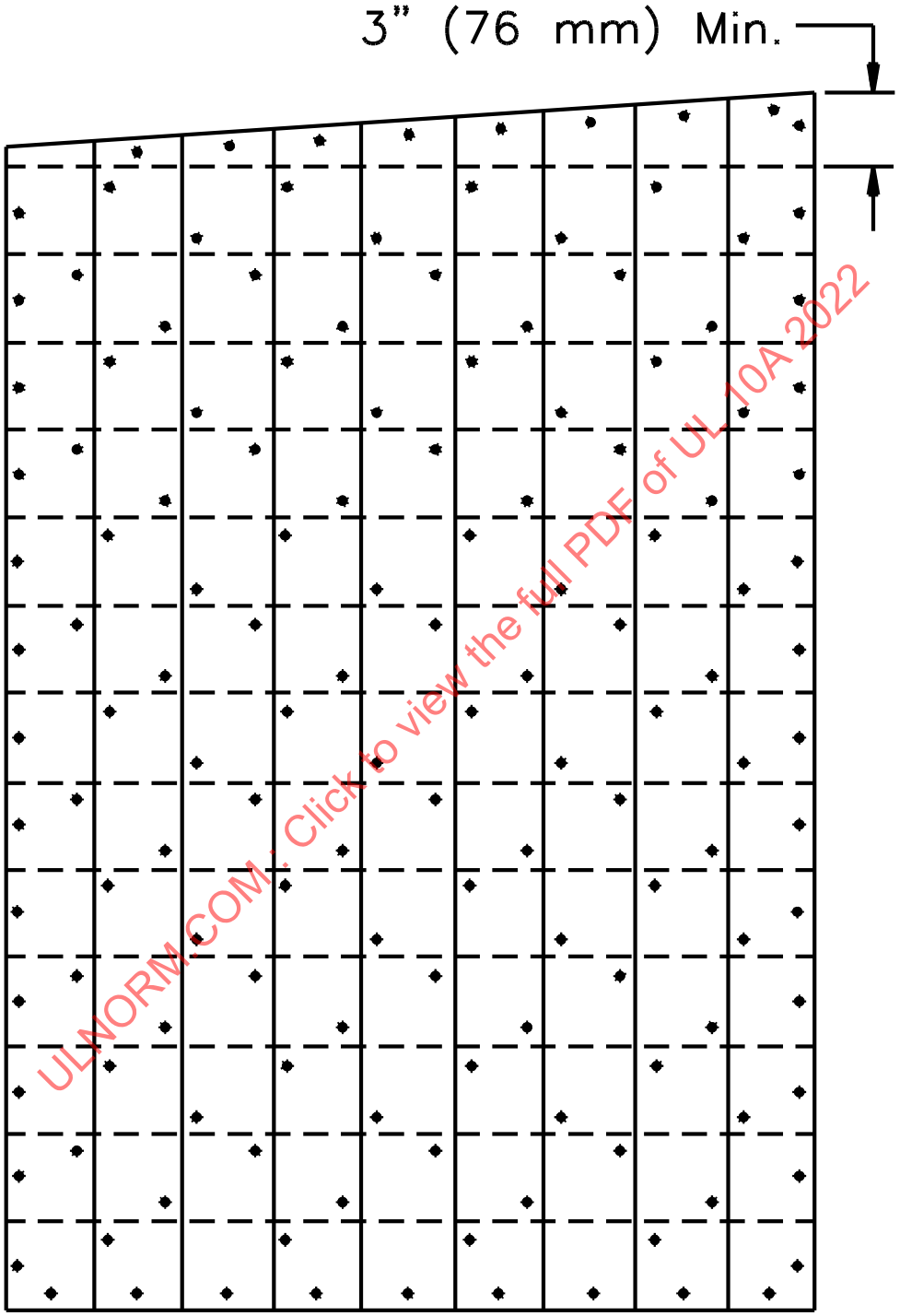
(See 7.3.1 – 7.3.7)

Figure 7.4

Nailing for three-ply cores only – 4-1/2- to 8-inch stock



(See 7.4.1 – 7.4.8)

8 Finished Cores

8.1 A finished three-ply core shall not be less than 2-1/4 in (57.2 mm) nor more than 2-5/8 in (66.7 mm) in thickness, and a finished two-ply core shall not be less than 1-1/2 in (38.1 mm) nor more than 1-3/4 in (44.5 mm) in thickness.

8.2 A finished three-ply core door which is less than 2-1/4 in (57.2 mm) thick as specified in 8.1 is to be marked in accordance with the schedule for two-ply doors.

8.3 The cores shall have true corners.

8.4 All edges shall be finished smooth and square. The meeting edges of swinging doors shall be square or beveled 1/4 in (6.4 mm) (not rabbeted).

9 Sizes of Steel Sections

9.1 Coated steel sections shall be not larger than 14- by 20-in (356- by 508-mm) size.

9.2 Corner sections shall not be over 14 in (356 mm) wide and of any length that avoids joints with edge sections coming under miter fold.

9.3 Edge sections (excepting "cap" sections) shall be of the same width as corner sections and of any convenient length.

9.4 Cap sections shall be of any convenient length and equal in width to thickness of core plus 3-1/2 in (89 mm).

10 Forming of Steel Sections

10.1 Turned edges of coated steel sections shall be parallel to cut edges. Turned up portions of all sections shall be of uniform width.

10.2 Face sections, excepting the face sections used in the row forming the closure, shall have one vertical edge turned 5/8 in (15.9 mm) and the other vertical edge doubled under 1-3/16 in (30 mm), and the doubled edge then turned up 5/8 in (15.9 mm) from cut edge as shown in Figure 10.1, Section A-B.

10.3 Face sections, excepting face sections forming top horizontal seams, shall have both horizontal edges turned 5/8 inch (15.9 mm) to lock with edge and other face sections shown in Figure 10.1, Section C-D.

10.4 Face sections forming top horizontal seams, excepting seams formed with a cap, shall have the lower horizontal edge turned 5/8 in (15.9 mm) to lock with other face sections, and the other horizontal edge doubled under 1-3/16 in (30 mm) and the double edge then turned up 5/8 in (15.9 mm) from cut edge.

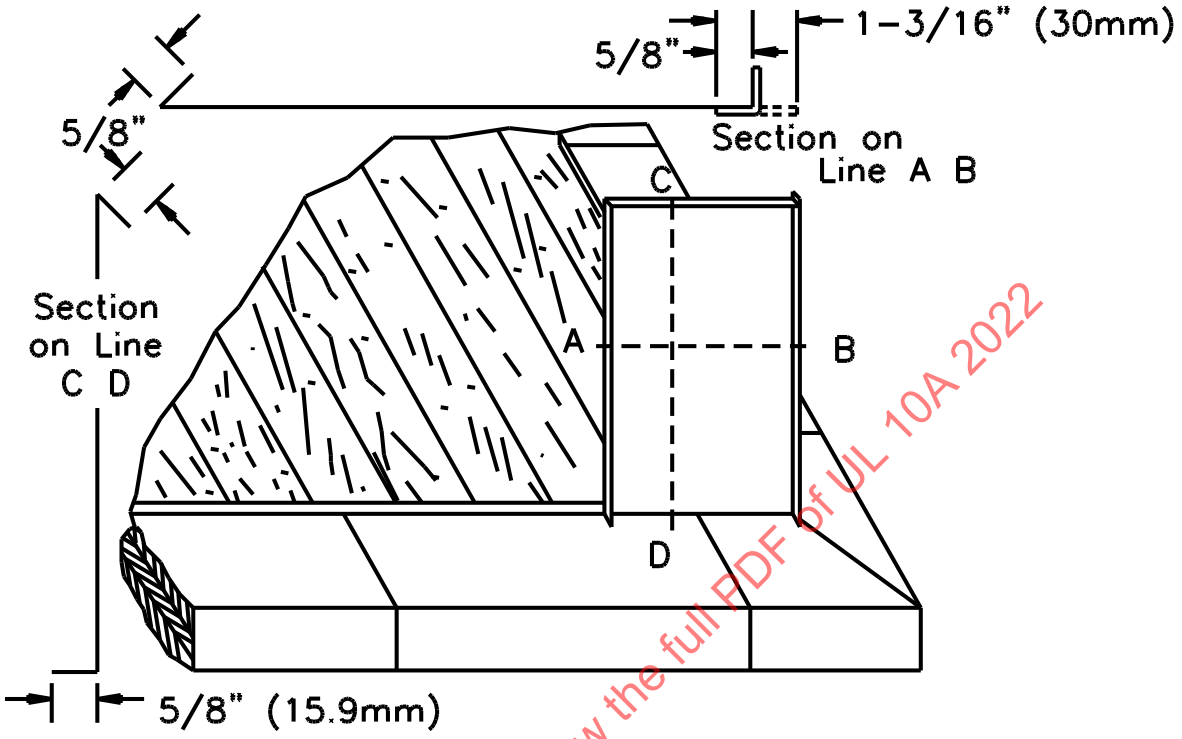
10.5 Face sections forming top horizontal seams with a cap shall have both horizontal edges turned up 5/8 in (15.9 mm) so as to lock with cap and other face sections.

10.6 Corner sections shall have all edges turned 5/8 in (15.9 mm) so as to lock with edge and face sections as shown in Figure 10.2.

10.7 Edge sections, excepting cap sections, shall have all edges turned 5/8 in (15.9 mm) so as to lock with corner, face, and other edge sections as shown in Figure 10.3.

Figure 10.1

Application of metal sections on face of core



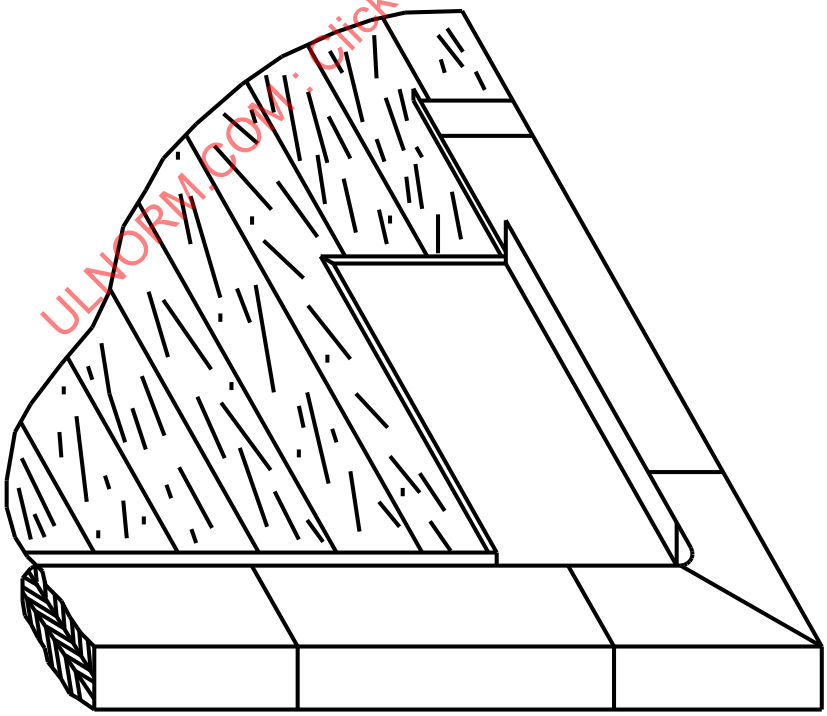


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Figure 10.2

Application of metal sections at corner of core

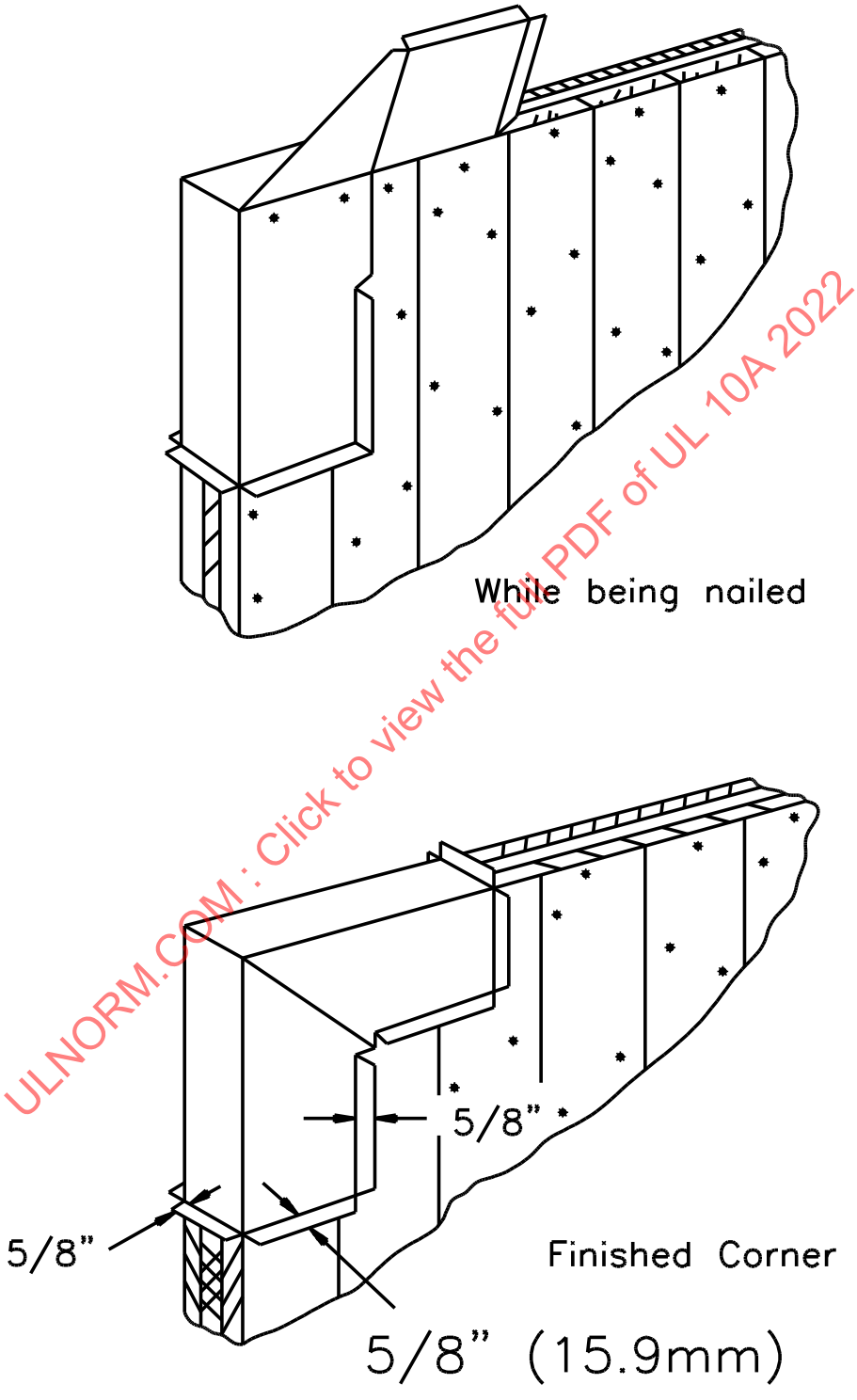
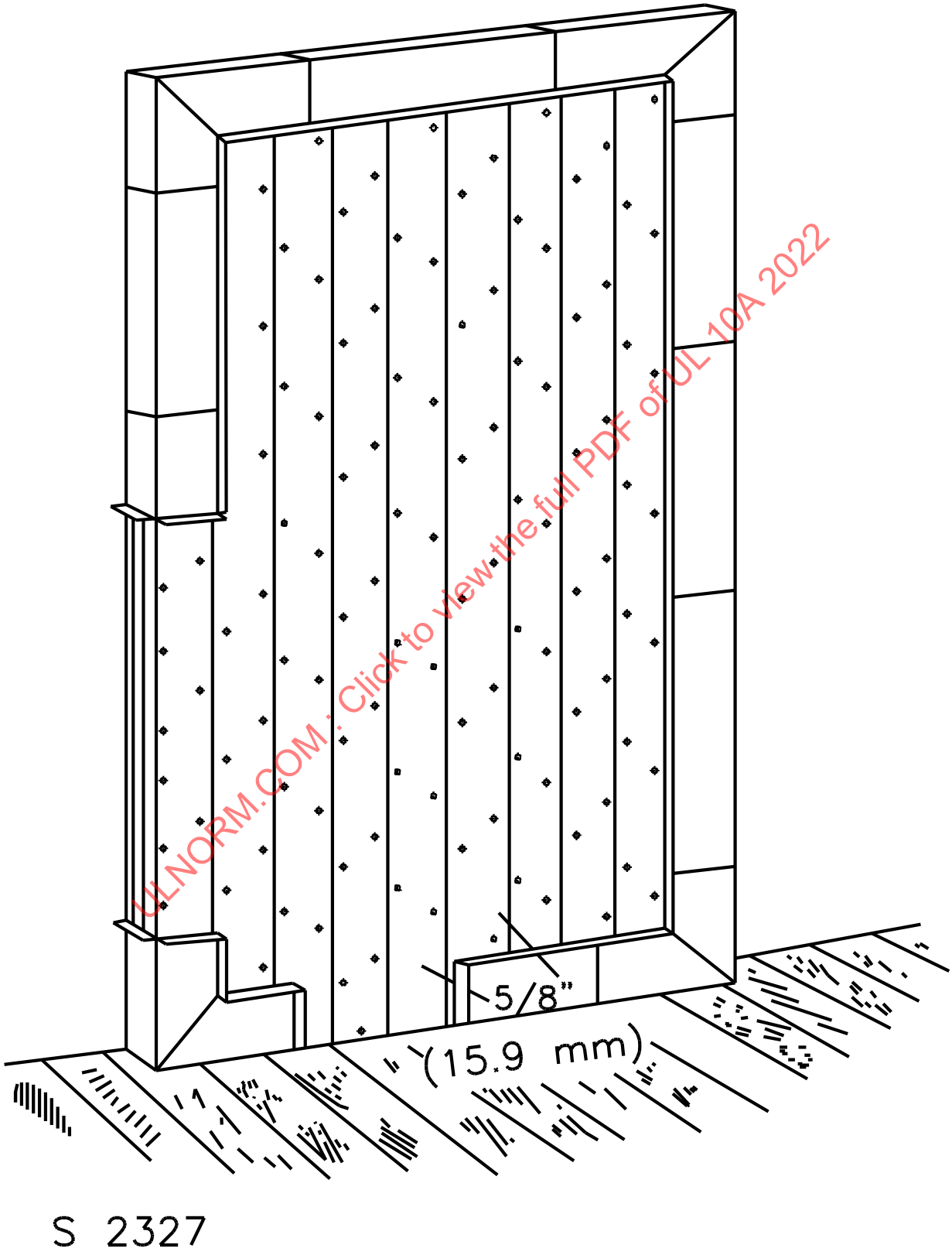


Figure 10.3

Application of metal sections at edges of core

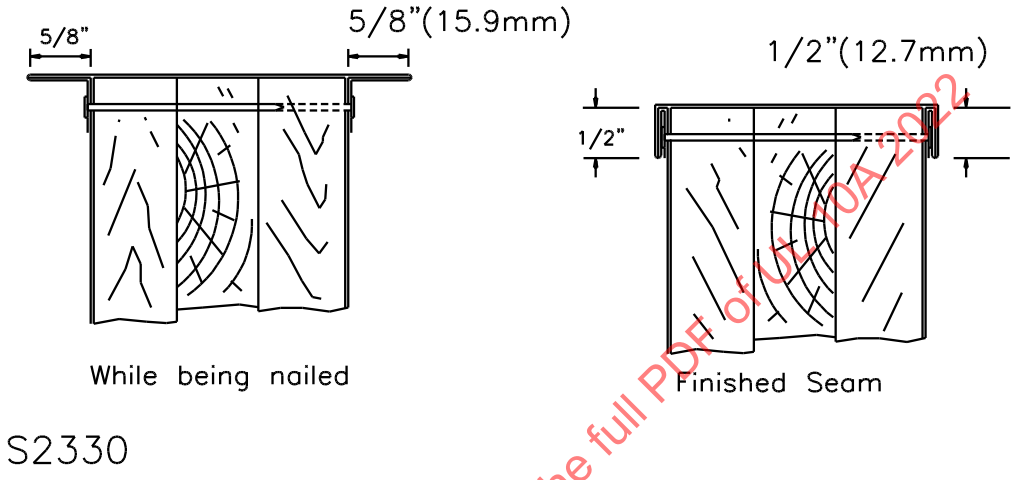


10.8 Cap sections shall have edges forming seams with other cap sections turned 5/8 in (15.9 mm).

10.9 Cap sections shall have edges forming top horizontal seams with face and edge sections doubled under 1-3/16 in (30 mm) and the portion next to the cut edge then turned down 5/8 in (15.9 mm) so as to lap the edge and face sections as shown in Figure 10.4.

Figure 10.4

Application of cap sections at top edge of core



11 Application of Steel Sections

11.1 The coated steel sections shall fit the core as flatly and tightly as practicable. Any air space created as the result of bulging shall not exceed 3/16 in (4.8 mm).

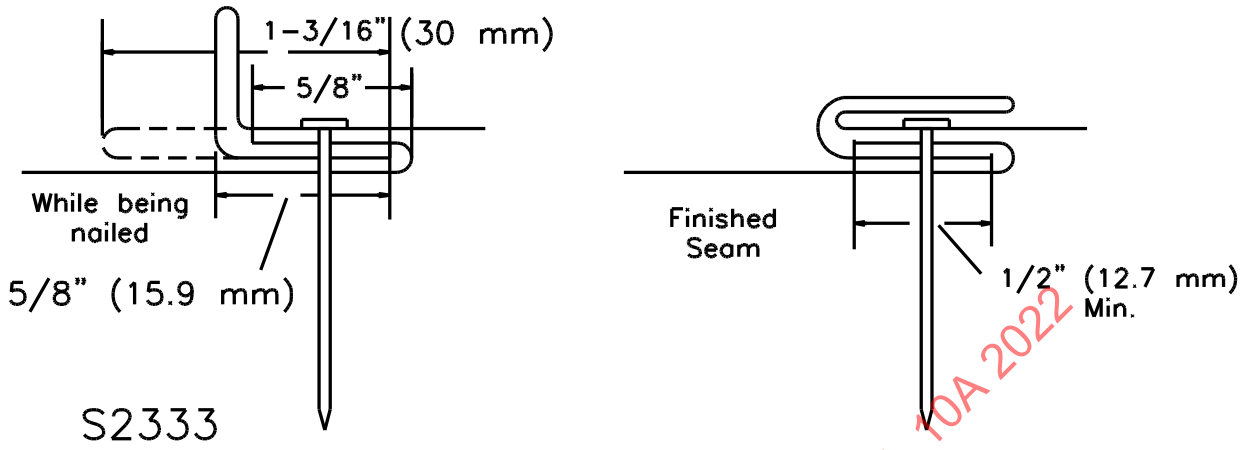
11.2 The sections shall be locked together not less than 1/2 in (12.7 mm).

11.3 Both faces of the core shall be covered with sections laid with their longer sides vertical. The sections in one vertical row on each face of the core shall be laid horizontally or vertically.

11.4 Vertical seams formed with face sections shall be hook seams with the upper sections having a fold for covering the heads of the nails in the seam as shown in Figure 11.1.

Figure 11.1

Vertical seams of face sections (top view)



11.5 Horizontal seams formed with face sections, excepting top horizontal seams, shall be hook seams as shown in Figure 11.3.

11.6 Top horizontal seams, excepting seams formed with a cap, shall have a fold for covering the heads of the nails in the seam as shown in Figure 11.1.

11.7 Top horizontal seams formed with a cap shall be lock seams with the locking portion of the cap having a fold for covering the heads of the nails in the seam as shown in Figure 10.4.

11.8 The upper ends of vertical seams shall be covered by the doubled edges of the top horizontal seams.

11.9 Each bottom corner of the core shall be covered with a section bent over the edges of the core and lapped an equal distance on both faces of the core, making a miter fold (without cutting) on each face, the folds on a door for use at an opening in an exterior wall being arranged to shed water as shown in Figure 10.2.

11.10 Each upper corner shall be covered the same as bottom corners if a cap is not used for covering the top edge of the core.

11.11 The bottom edge and the vertical edges of the core shall be covered with sections bent over the edges of the core and lapped an equal distance on both faces. The sections shall be joined to each other and to the corners with hook seams, the seams being made so as to shed water if the door is for use at an opening in an exterior wall as shown in Figure 10.1 and Figure 10.3.

11.12 The top edge of the core shall be covered the same as the bottom and vertical edges if a cap is not used.

11.13 The top edge of the core shall be covered with a cap when the door is for use at an opening in an exterior wall or when the door has a segmental head. The cap shall be formed of sections joined to each other with hook seams as shown in Figure 11.2.

11.14 When glass panels are supplied and band or angle iron reinforcement for glass grooves is used, the vertical edges of the panel openings shall be covered with terne or zinc-coated steel sheets secured to

the face sections by vertical seams. The covering at the horizontal edges of the opening shall be cap seams as shown in Figure 15.1.

Figure 11.2

Seams between corner and edge sections

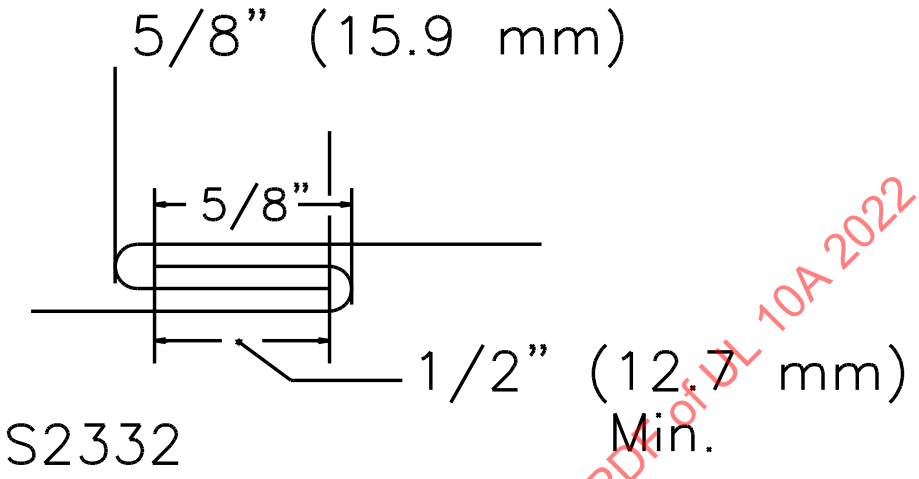
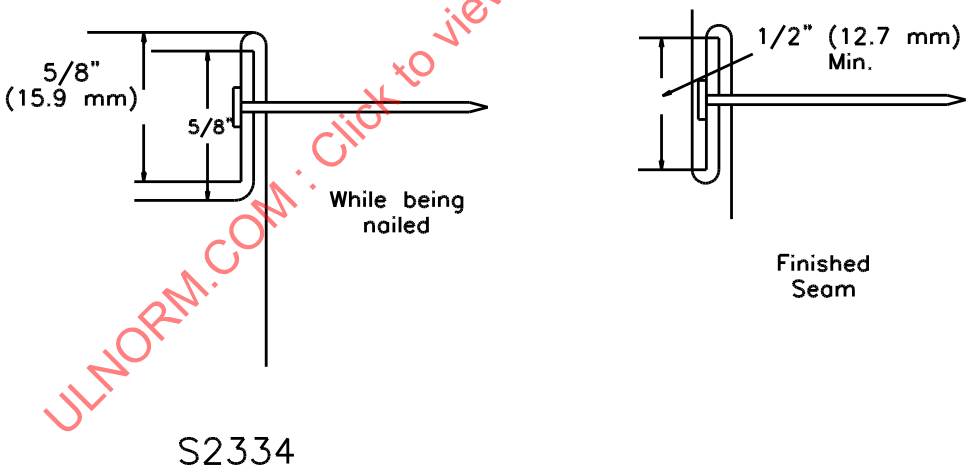


Figure 11.3

Horizontal seams of face sections (side view)



12 Nailing of Steel Sections

12.1 The nails shall pass straight into the core.

12.2 The nails shall pass as near as possible through the center of the lock in the seams as shown in Figure 10.4, Figure 11.1 and Figure 11.3.

12.3 Full-sized face sections shall be held to the core by 18 nails in the seams, with nails near but not in the corners, and with four nails along each short side and five along each long side of each section.

12.4 Face sections smaller than the 14- by 20-in (356- by 508-mm) size shall be held to the core by nails in the seams placed near but not in the corners, with at least two nails along each side, and with nails

spaced not over 3 in (76 mm) apart in horizontal seams and not over 4 in (102 mm) apart in vertical seams.

12.5 Vertical seams formed with face sections shall have nails through two thicknesses of each section as shown in Figure 11.1.

12.6 Horizontal seams formed with face sections, excepting top horizontal seams, shall have nails through two thicknesses of lower section and one thickness of upper section forming the seams as shown in Figure 11.2.

12.7 Top horizontal seams, excepting seams made with a cap, shall have nails through two thicknesses of each section forming the seams as shown in Figure 11.1.

12.8 Top horizontal seams formed with a cap shall have nails through one thickness of each section forming the seams as shown in Figure 10.4.

12.9 Each corner section shall be held to the core with two nails on each side near the edge of the core as shown in Figure 10.2.

12.10 When glass panels are supplied and band or angle iron reinforcement for glass grooves is used, nails securing seams between face sections and strips covering edges of panel openings shall be spaced at intervals not exceeding 3 in (76 mm) in horizontal seams and 4 in (102 mm) in vertical seams, with one nail near but not in each corner.

13 Protection of Nail Heads

13.1 Heads of nails in vertical seams formed with face sections shall be covered by the doubled edges of face sections as shown in Figure 11.1.

13.2 Heads of nails in horizontal seams formed with face sections, excepting top horizontal seams, shall be covered by the face sections as shown in Figure 11.2.

13.3 Heads of nails in top horizontal seams formed with face sections shall be covered by the double edges of face sections or cap as shown in Figure 10.4 and Figure 11.1.

13.4 Heads of nails in corner sections shall be covered by the miter fold as shown in Figure 10.2.

14 Astragals

14.1 Swinging doors to be mounted in pairs shall be supplied with at least one astragal extending the full height of the doors. Sliding doors to be mounted in pairs shall be provided with only one astragal extending to within 4 in (102 mm) of the top and bottom of the doors. Astragals shall be of steel not less than 3/16 in (4.8 mm) thick and 3 in (76 mm) wide. The astragal shall be fastened to the door, when installed, by not less than 1/4-in (6.4 mm) carriage or stove bolts spaced at intervals not exceeding 12 in (305 mm). Top bolts shall not be over 5 in (127 mm) from the end of the astragal and bottom bolts not over 3 in (76 mm). Bolts shall pass through astragal and be secured by nuts on the opposite side of the door. Washers shall be used under nuts. Bolt holes in the astragal and door shall be located so that the astragal extends at least 3/4 in (19.1 mm) beyond the edge of the door to which it is attached.

14.2 In case the astragal is to be attached in the field, the bolt holes in the astragal shall be drilled by the manufacturer to ensure proper spacings and fit. In such case, it is not required to drill the door for the bolts.

15 Glass Panels

15.1 General

15.1.1 The construction details for any one of the following types of glass panel construction shall not be used in or combined with any of the other types described.

15.2 Reinforcements for grooves

15.2.1 In all doors supplied with grooves for glass constructed of angles, the opening shall be reinforced either by means of a band-iron strip not less than 1/8 in (3.2 mm) in thickness and equal in width to the thickness of the core or by means of 1-3/8- by 7/8- by 1/8-in (35- by 22.2- by 3.2-mm) angles bolted together through the door. See Figure 15.1 – Figure 15.3.

15.2.2 The band-iron strip shall be secured to the inner edges of the panel opening by not less than two wood screws and shall be supplied with threaded holes for receiving the bolts which secure the angles forming the glass grooves.

15.2.3 The 1-3/8- by 7/8- by 1/8-in (35- by 22.2- by 3.2-mm) angles shall be bolted together through the door by 3/16 in (4.8 mm) stove bolts spaced at intervals not exceeding 12 in (305 mm) and not more than 2 in (51 mm) from each end. They shall be supplied with threaded holes for receiving the bolts which secure the angles forming the glass groove.

15.3 Grooves constructed of angles

15.3.1 The angles used in forming the grooves shall not be less than 1/8 in (3.2 mm) in thickness and shall be of such other dimensions as to provide a groove not less than 3/4 in (19.1 mm) deep by 3/8 in (9.5 mm) wide as shown by Figure 15.1 – Figure 15.3.

15.3.2 Rivets or screws used to secure the groove angles to the reinforcement shall be spaced at intervals not exceeding 12 in (305 mm) and not more than 2 in (51 mm) from each end.

15.4 Grooves constructed of formed sheet metal

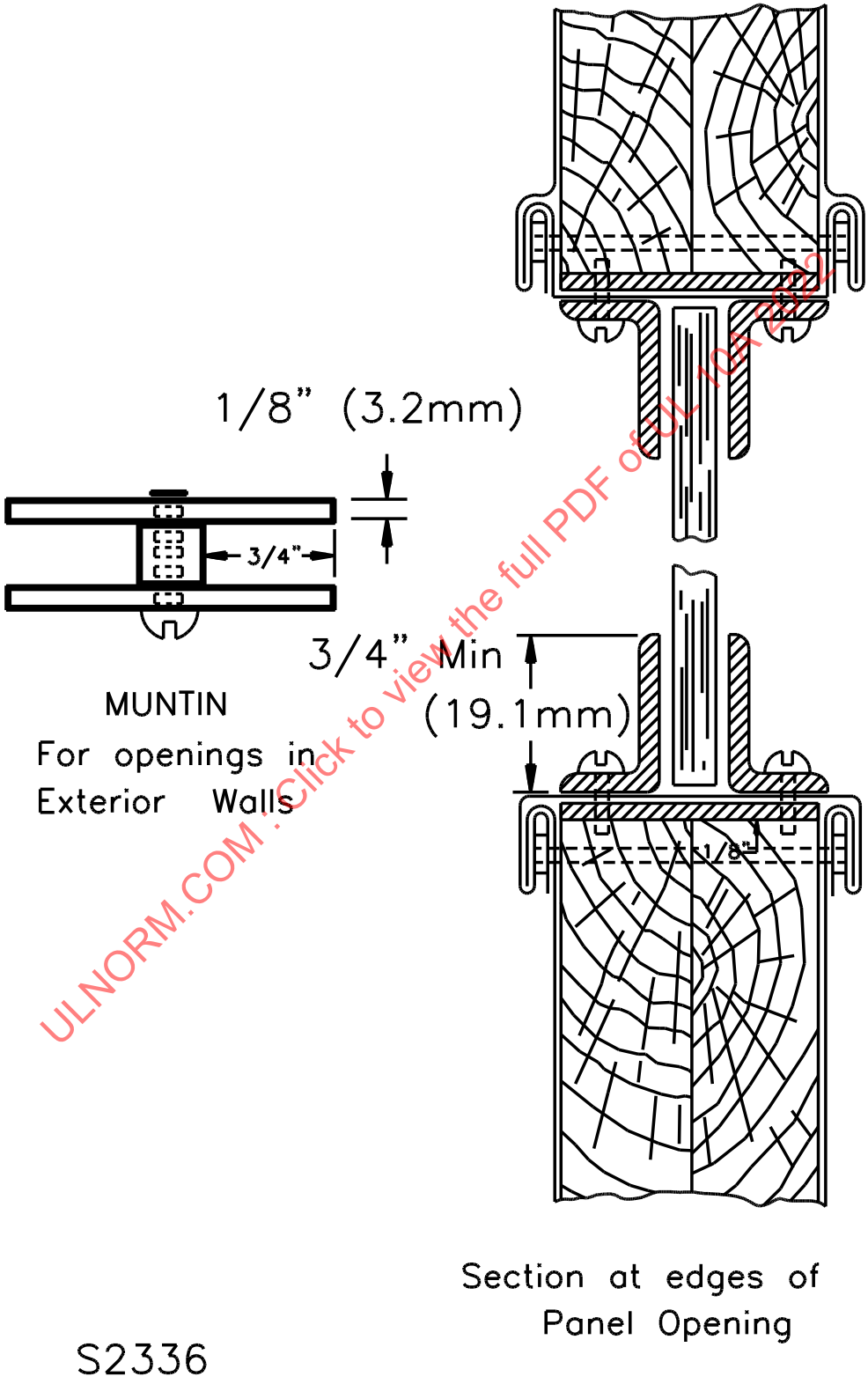
15.4.1 Grooves of this type shall be formed of a single piece of galvanized or terne coated sheet steel having an uncoated thickness of not less than 0.020 in (0.51 mm) as shown by Figure 15.4, Figure 15.5, and Figure 15.6, and shall not be less than 3/4 in (19.1 mm) deep by 3/8 in (9.5 mm) wide. See also 15.5.2.

15.4.2 The edges of this formed strip shall be secured to the sheet metal face sections of the door by vertical seams at the vertical edges of the opening as shown by Figure 15.6, Section B-B, and by cap seams at the horizontal edges of the opening as shown by Figure 15.6, Section D-D.

15.4.3 In the case of openings for glass employing only one light, the sheet-metal groove shall be constructed as shown in Figure 15.6, Section A-A. In this type of groove the reinforcing strip shall be 1/8 in (3.2 mm) band iron and shall either be continuous for the full length of the groove or consist of individual reinforcing strips not less than 1 in (25.4 mm) long for each screw securing the movable molding. The reinforcing strip shall be secured to the fixed part of the groove by rivets or screws, independent of the screws fastening the removable molding. Rivets or screws used to secure the reinforcing strip or the removable molding shall be spaced at intervals not exceeding 12 in (305 mm) and not more than 2 in (51 mm) from each end.

Figure 15.1

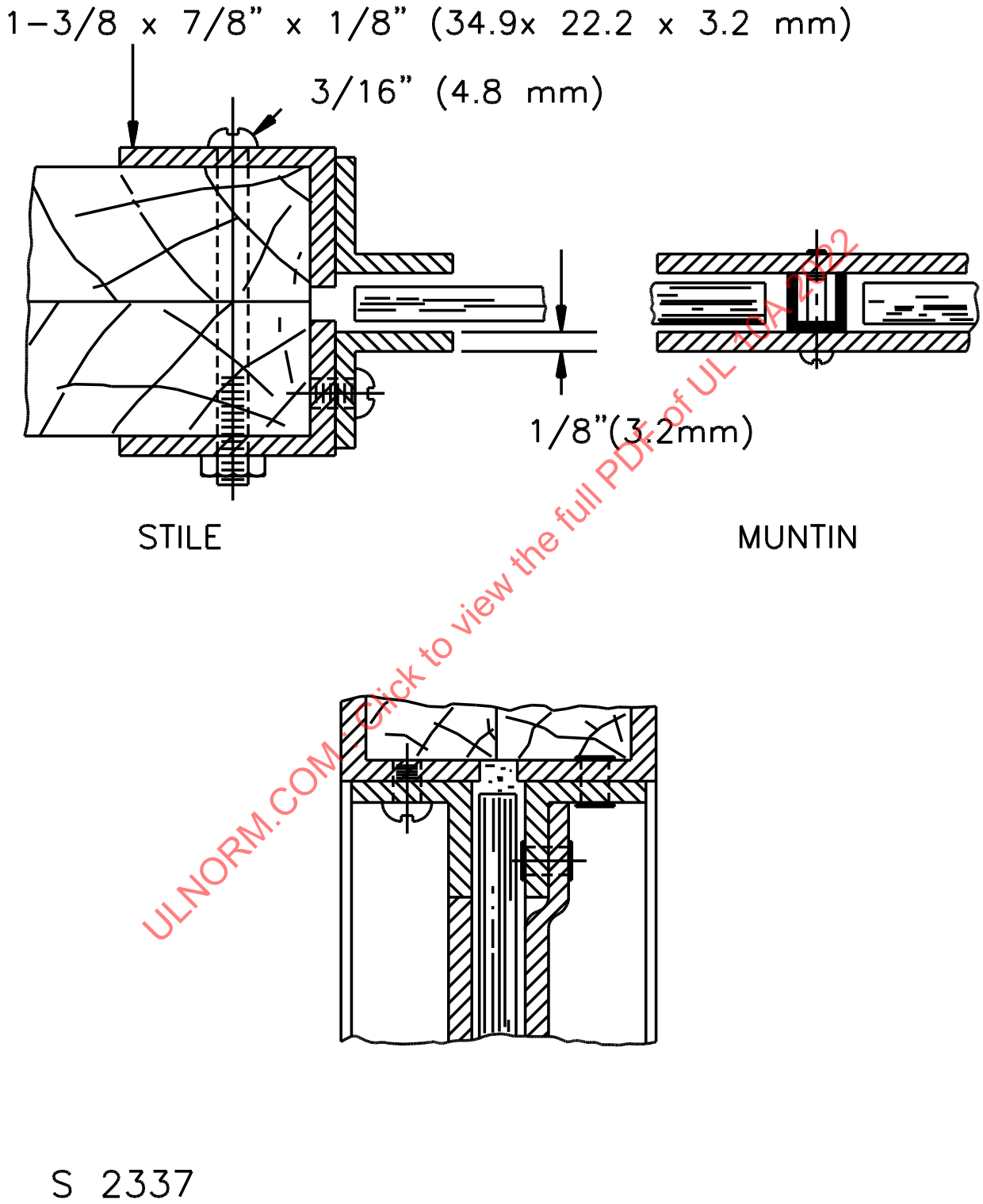
Glass opening details



All angles and strips to be 1/8 in (3.2 mm).

Figure 15.2

Glass opening details



All angles and strips to be 1/8 in (3.2 mm).